Assessment 9

The due date for submitting this assignment has passed. Due on 2019-04-03, 23:59 IST.
As per our records you have not submitted this assignment.

Instructions:

1. Answer all questions; all questions carry equal mark.
2. All symbols have their usual meanings.
3. Only one of the options is correct.
4. The 4th question is a "fill in the blank" type of question. You are supposed to enter a numerical answer to fill the blank as given in the question. Your answer must be correct upto two decimal places (unless it is an integer).
5. You can see the correct answers after the last date of submission.

Note:
Marks obtained in this quiz will be counted towards your final score. You can take the quiz and submit it any number of times, and the latest submitted answers will be taken as your final submission.

Physical Constants:

- \( m_0 = 9.11 \times 10^{-31} \text{ kg} \)
- \( h = 6.627 \times 10^{-34} \text{ J.s} \)
- \( e = 1.602 \times 10^{-19} \text{ C} \)
- \( k_B = 1.38 \times 10^{-23} \text{ J/K} \)

1) What is the maximum possible number of longitudinal modes in the output of a Fabry-Perot semiconductor laser? Given: cavity length = 250 \( \mu \text{m} \), active medium refractive index = 3.4, laser bandwidth = 1 THz.

   - 5
   - 6
   - 11
   - 12

No, the answer is incorrect.
3) Which one of the following statements regarding a double-heterostructure laser is correct?

- No, the answer is incorrect.

Score: 0

Accepted Answers:
*Increasing the width of the active layer.*

4) It is given that for a semiconductor laser of length 500 µm, the threshold gain coefficient is 36 cm⁻¹. If the cleaved end facets have reflectivities of 40% each, and there is no other loss in the cavity, then the optical confinement factor of the lasing mode is ________.

No, the answer is incorrect.

Score: 0

Accepted Answers:
*(Type: Range) 0.50, 0.52*

5) For a particular semiconductor gain medium, the following observations were made:

- When the injection current through the gain medium is zero, the intensity of light at the output is reduced to half its input intensity.

- For an injection current of 150 mA, the intensity of light at the output is 4 times as that of the input.

By what injection current should the gain medium be pumped so that intensity of light at the output is 8 times as that of the input? (Assume that the ‘peak gain’ is at the input wavelength for all currents)

Note: You may use the formula

\[ \gamma_p = \alpha_a \left( \frac{i}{I_T} - 1 \right) \]
where the symbols have their usual meaning.

- 100 mA
- 150 mA
- 200 mA
- 250 mA

No, the answer is incorrect.
Score: 0
Accepted Answers:
200 mA